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Relationship between sleep quality, sleep duration and glucose control in pregnant women with gestational diabetes

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A number of studies to-date suggest that poor sleep quality and short sleep duration are associated with development of glucose intolerance and type 2 diabetes in the general population⁽¹⁾. Moreover, studies in pregnant women have found associations between sleep disturbance and development of impaired glucose tolerance and gestational diabetes (GDM)⁽²⁾. However, there remains limited research on the relationship between sleep quality, sleep duration and glucose control in pregnant women with established GDM⁽³⁾. The present study therefore aimed to determine whether sleep quality and sleep duration is associated with glycemic control in pregnant women with GDM during the third trimester.

Sixty five women with GDM were recruited from Leeds Teaching Hospitals NHS Trust. Data were collected at 30–32 weeks gestation. Glucose control was assessed using 6 days of blinded continuous glucose monitoring (CGM) using an iPro2 device (Medtronic). Sleep was assessed using a validated sleep questionnaire (the Pittsburgh Sleep Quality Index, PSQI). Linear regression (adjusted for pre-pregnancy BMI and age) was performed to assess the association between total PSQI score, self-reported sleep duration and CGM measures of glucose control including: percentage of time in pregnancy target glucose range 3.5–7.8 mmol/l; area under the curve (AUC) >7.8 mmol/l; standard deviation (SD) of glucose values; average glucose level; and total number of glucose excursions.

Our results show that a higher PSQI score (indicating poorer sleep quality) was associated with: a lower proportion of time in glucose target (β -0.69; 95 % CI -1.22 to -0.15); a greater AUC above target (β 0.01; 95 % CI 0.002 to 0.017); a higher SD glucose signifying higher variability in glucose levels (β 0.02; 95 % CI 0.004 to 0.04) ; a higher average glucose levels (β 0.04; 95 % CI 0.007 to 0.079); and a greater number of glucose excursions (β 0.46; 95 % CI 0.066 to 0.852). On the other hand longer sleep duration was associated with: a higher proportion of time within glucose target (β 1.33; 95 % CI 0.086 to 2.58); a smaller AUC above target (β -0.02; 95 % CI -0.033 to 0.002); and a lower SD glucose (β -0.05; 95 % CI -0.097 to -0.008).

Continuous glucose monitor outcome	PSQI score			Sleep duration		
	β Coef.	95 % CI	P-value	β Coef.	95 % CI	P-value
Proportion of time in glucose target	-0.69	-1.22 to -0.15	0.012*	1.33	0.086 to 2.58	0.037*
AUC above target	0.01	0.002 to 0.017	<0.001*	-0.02	-0.033 to 0.002	0.077
SD glucose	0.02	0.004 to 0.04	0.017*	-0.05	-0.097 to -0.008	0.023*
Average glucose	0.04	0.007 to 0.079	0.019*	-0.01	-0.099 to 0.072	0.758
Total excursions	0.46	0.066 to 0.852	0.023*	-0.75	-1.67 to 0.174	0.111

* significant P-value

This study suggests that sleep quality and sleep duration in the third trimester may be an important factor in achieving optimum glucose control in women with GDM. It offers the possibility that interventions targeted to address sleep quality/duration may help achieve tighter glucose control and thereby better pregnancy outcomes at this stage in pregnancy.

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3. Twedt R, Bradley M, Deiseroth D *et al.* (2015) Sleep duration and blood glucose control in women with gestational diabetes mellitus. *Obstet Gynecol* **126**, 326–31.